REVIEW ARTICLE

Adolescent health problems in India: A review from 2001 to 2015

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Abstract

Adolescence is a period in which all the habits and behaviour like high risk behaviour, substance abuse and eating habits develop that have lifelong impact. In India, programmes have been launched to address all the problems faced during adolescent period, still then adolescents are facing problems. In this review the problems faced by Indian adolescents were highlighted from the past 14 years' studies. The studies were searched from 2001 to 2015 from Pub Med, Google scholar and other community medicine and public health related journals. The problems included were sexual health and teenage pregnancy, problems related to menstruation, illicit drugs, tobacco and alcohol use. Anaemia, eating problems, obesity, behavioural problems and oral health among adolescent were also reviewed. Nineteen abstracts and 52 full texts were available. Sexual health knowledge among adolescent varies from 41% to poor. Knowledge about sexually transmitted diseases and sexuality is less. Prevalence of dysmenorrhoea varies from 67.2% to 56.15% among adolescent girls. Prevalence of tobacco use varies from 25.1 to 12%. Prevalence of obesity varies from 3.4% to 0.35% and overweight varies from 5.5% to 5.84%. Prevalence of anaemia varies from 29% to 41.1%. Adolescents are facing depressive problems, physical fights, worry and loneliness. Prevalence of depression varies from 18.4% to 13.3%. Prevalence of dental problems varies from 18.2 to 41%. The review revealed that adolescents in India are facing problems of sexually transmitted infections, dysmenorrhea, tobacco and alcohol use, depression, physical fights, worry, loneliness and oral health problems. This needs a participation of family, community and government to resolve the issue.

Key Words

Adolescent; Alcohol; Obesity; Oral Health; Sexual Health.

Introduction

"Adolescence" literally means "to emerge" or "to attain identity" and is essentially the period of rapid physical and psychological development starting from the onset of puberty to complete growth and development. All adolescents go through a myriad of physical, hormonal, psychological, behavioural and social developmental changes. Because of illiteracy, unawareness and social taboos, the health of millions of adolescents worldwide are neglected. They do not have the information, skills, health services and supports of life. In this review the problems faced by adolescents related to health and psychological aspects were highlighted from India from previous 14 years (2001 to 2015) studies.

Demographic profiles of adolescents in India

The World Health Organization (WHO) defines "adolescent" as an individual between 10 to 19 years of age. (1) According to census 2011 report, 20.9% of population in India comprise of adolescents. The trend is static or small decreasing trend compared to 21.9% in 2001 census. But the number of adolescents is increasing to approximately 253.2millions. The rural and urban population constituted 22% and 19%

adolescents respectively. (2) According to sample registration system statistical report 2010, 21% of the total Indian population is comprised of adolescent. Out of them 11% is contributed by male and 10% contributed by female. The World Population Day in the year 2003 had been declared as the year of one billion adolescents in the world.(1)

Material and Methods

Literature search restricted to English language and publications from the year 2001 to 2015, was carried out on the Pub med and Google scholar database using the search terms: adolescent problems, India, sexual problems, prevalence of overweight and obesity, nutritional status, tobacco use, alcohol use, menstrual problems and oral health. The literature search was carried out during Jan 2013 to June 2015. Criteria for inclusion was studies from India among adolescent age group.

Review of the studies on adolescent health are categorized into following headings

1. Sexual health issues and teenage pregnancy
2. Problems related to menstruation and menstrual hygiene
3. Adolescent tobacco, alcohol and illicit drug use
4. Obesity, overweight, eating problems, under nutrition and anaemia among adolescent
5. Behavioural problems, depression, and other psychiatric conditions
6. Oral health among adolescent

Results

Sexual health issues and teenage pregnancy (Table 1)

Adolescent and youth are vulnerable to sexually transmitted infections, including HIV. (1) About 16 million women in the age 15–19 years give child birth each year in the world. This constitutes 11% of all births worldwide. Ninety-five per cent of these births occur in low- and middle-income countries. Half of all adolescent births occur in just seven developing countries, in which India is also included. (3)

High rates of adolescent child bearing found in South and South-West Asia due to marriage at early age. India is third number in the levels of adolescent child bearing. (4)

Despite communication barriers, e.g., lack of knowledge and cultural proscriptions, Indian families are interested in and willing to communicate about sex-related topics. (5) Though age at marriage is increasing; data from NFHS-3 (National Family Health Survey 3) shows that 27% young women and 3% young men in the age group of 15-19 year were married at the time of the survey (2005-06). Thirty percent of women in the age group of 15-19 years had a live birth by the age of 19 years.

Sexual health awareness among adolescents about contraception uses, sexually transmitted diseases, sharing sexual health-related problems with friends and doctors is very less. Also knowledge about right gestational age limit for legal abortion and tubectomy is very less. Awareness about sex education is very less. Gadkari RP *et al* found that awareness was better with increasing age, higher education and nuclear family. (6)

In India husbands make the decision whether their wives could seek advice about delaying and spacing pregnancies, limiting the number of children and to treat STDs (Sexually Transmitted Diseases). Mothers-in-law sometimes influence these decisions. Girls have neither decision-making power nor influence. (7)

The uses of postpartum contraception among adolescent mothers revealed that more than half were using no contraception. Receipt of prenatal contraceptive counselling and receipt of a postpartum check-up were both associated with a decreased likelihood of having sex without contraception. Prenatal contraceptive counselling was also associated with an increased use of oral contraceptive pill. (8) The contraceptive use among adolescents is very less because the social relevance attached to pregnancy in this age group. There are misconceptions and negative beliefs like impotence after use of condom, weakness after sterilization, fear of becoming obese after use of oral contraceptive pills. (9)

Knowledge about RTIs/STIs (Reproductive Tract Infections / Sexually Transmitted Infections) is much higher among literate adolescent women (41%) compared to illiterate (33%) women. The prevalence of RTIs/STIs was highest in the western region (41%) of India and lowest in the southern region (14%). (10)

Only 20% of married adolescent women in India sought treatment for RTIs/STIs. Shashi Kumar R *et al* found in their study that average age at first sexual contact for boys was 13.72 years and for girls was 14.09 years. While average age at first intercourse in those who had it was 15.25 years for boys and 16.66 years for girls. (10)

Problems related to menstruation and menstrual hygiene (Table 2)

Adolescent girls most commonly faced menstrual problems like dysmenorrhoea and premenstrual syndrome. Dysmenorrhoea (67.2%) is the commonest problem and 63.1% had one or the other symptoms of pre-menstrual syndrome (PMS). (11) This is the main reasons for absenteeism from school. Daily routine of girls was affected due to prolonged bed rest, missed social activities or commitments; disturbed sleep and decreased appetite. Girls from families of high socio-economic class have significantly lower mean ages of menarche in both urban and rural area. The mean age of menarche was significantly higher in girls involved in vigorous sporting activity in urban area compared to their non-sporting counterparts. (12)

In India, menstruation is surrounded by myths and misconceptions with a long list of "do's" and "don't" for women. Hygiene-related practices of women during menstruation are of considerable importance, as it may increase vulnerability to Reproductive Tract Infections (RTIs) / STDs (Sexually Transmitted Infections). Poor menstrual hygiene is one of the major reasons for the high prevalence of RTIs in the country and contributes significantly to female morbidity. Most of the adolescent girls in villages use rags and old clothes during menstruation, increasing susceptibility to RTI's. In June 2010, the Government of India proposed a new scheme towards menstrual hygiene by provision of subsidized sanitary napkins to rural adolescent girls. But there are various other issues like awareness, availability and quality of napkins, regular supply, privacy and water supply, disposal of napkins, reproductive health education and family support which needs simultaneous attention for promotion of menstrual hygiene. (13)

Adolescent tobacco and alcohol use (Table 3)

Uses of alcohol and tobacco are on increasing trend among adolescent age groups of school and college going students. It is basically due to peer pressure, as a source of stress reliever, easy availability and promoted by elderly or friend circles. Current use of smoked and smokeless tobacco was 9.1% and 17.4% respectively among adolescent. (14) Substance abuse is quite common in India. Studies have found that tobacco, alcohol and even the injectable drugs are commonly used. (4)

In a study by Surani NS, in Mumbai found that there was no difference in exposure to media messages between users and nonusers of tobacco and areca nut. The number of school students who reported ever use of tobacco was quite low (5.1%). (15)

Janardhanan C *et al* found in a study conducted in south India that volatile solvent used as inhalant is going on increasing among adolescents. The mean age of use of inhalant was 16.23 years. More than one substance dependence was also identified in > 50% cases. The psychiatric co morbidity associated with substance abuse were psychosis and depression. Inhalant user group reported more withdrawal symptoms. The other substance user group reported a significantly higher occurrence of aggression, externalizing symptoms and attention-deficit hyperactivity disorder (ADHD). Majority of substance abuse adolescent have no occupations. The most commonly reported reason for initiation was peer pressure followed by 'curiosity'. (16)

A recent clinic-based study from a tertiary care centre in North India reported that a typical case profile of inhalant abusers were unmarried male, mean age of 19 years, unemployed, students, urban residence, nuclear family, middle socioeconomic status and poor social support. Inhalant dependence was identified in 81%. (17)

Seth *et al* reported that the main reason for initiation of solvent abuse by the adolescents was peer pressure, followed by a tendency to experiment by oneself and associated with more impulsive and fearless temperaments and report more past-year antisocial behaviour. (18) Kumar *et al* found in his study that conduct disorder has been the most common psychiatric diagnosis among inhalant abuser of adolescent.(17) Increased association of affective disorders was detected in patients with inhalant use. (17)

Forty percent of the adolescents had a family history of alcohol use problems and 48% that of tobacco use. (19) Mean age of the initiation of inhalant use was 11.6 years (SD ± 2.17 years). It varied from 9 to 18 years. Forty percent of the adolescents had made a previous abstinence of alcohol attempt. (19)

Obesity, eating problems, under nutrition and anaemia among adolescent (Table 4)

Obesity is emerging as a public health problem among adolescents in India. India is going towards epidemiological transitions. Cultivations, productivity, economic enhancement all contribute that there is no scarcity of foods. In a study prevalence of obesity and overweight was 16.6%. Body dissatisfaction was highest among overweight youth and girls. (20)

It is estimated that 30% of obesity begins in childhood (21) and about 50-80% of obese children become obese adults. (22) Although this epidemic is well-described in the developed world, the prevalence is also escalating in developing countries, like India. (23) A review of childhood obesity prevalence studies in India revealed that a large degree of variation in the prevalence of overweight (8.5-29.0%) and obesity (1.5-7.4%) among school-aged youth, with the highest prevalence among urban youth and youth of higher socio-economic status (SES). (24)

The combined prevalence of overweight and obesity among school-going adolescents (12–18 years) in Delhi was shown to be 16.6%. (25) The prevalence was up to 7 fold higher among private school students as compared to those in Government schools (26.6% vs. 3.9%,). (26)

Bishwalata R in her study found that the prevalence of overweight was 4.2% according to the WHO standard. The prevalence of obesity is 0.8% among school children, which is very low. The possible reasons for this include a more traditional low-fat diet, less exposure to sedentary past-times, genetic constitution of adolescents of Manipur and a greater time spent playing outdoors. (27)

In a study by Deoke A the prevalence of overweight in students was 5.84% and obesity was 0.35%. The combined prevalence of overweight and obesity was 6.19%. The prevalence of overweight in boys is 5.31% and obesity was 0.63% and that in girls is 6.53% and 0% respectively. (28)

Obesity can be seen as first wave of a defined cluster of non-communicable diseases called "New World Syndrome" creating an enormous socio-economic and public health burden in poor countries. Type 2 diabetes mellitus (DM) has traditionally been considered as a disease of adults. However, in the last 2 decades, it is increasingly being reported in children and adolescents. Increasing prevalence of obesity and poor physical activity are precipitating type 2 DM at younger ages. (29)

Adequate nutritional intake is very essential for adolescent for normal development. But during adolescent period more prevalence of unhealthy food habits, skipping meals, remain fast to lose weight. Over half of the children skipped breakfast, ranging from daily to once in two weeks, the main reason being getting up late in the morning .(30)

Adolescent usually follow an erratic food eating habits like missing breakfast. A survey on eight school children of Delhi whose average mean age was 14.29 years observed that significantly more Government school students with lower socio economic status consumed breakfast daily as compared to private school students with higher socio economic status (73.8% vs. 66.3%). (31) Overall prevalence of overweight and obesity among adolescents who consumed breakfast daily was significantly lower versus those who only sometimes or never consumed breakfast. Breakfast consumption was associated with greater physical activity versus those who never consumed breakfast. (31)

According to NFHS-3 report 60% girls in the age group 15 to 19 year were found to be anaemic. WHO global database on anaemia reported the proportion of population with anaemia (Hb < 11 g/dl) was 74.3%. Prevalence of anaemia among adolescent girls in the age group 12-14 years, 15 – 17 years and 15 – 19 years were 68.6%, 69.7% and 55.8% respectively. (32). The prevalence of anaemia among girls (Hb < 12 g %) and boys (Hb < 13 g %) is alarmingly high as per the reports of NFHS-3 and the National Nutrition Monitoring Bureau Survey (NNMBS).

The prevalence of anaemia in India among adolescent girls and boys is 55.8% and 56.1% respectively. (33) The prevalence of anaemia among unmarried adolescent south Indian girls in an urban slum setting was 29%. Significant association of anaemia was observed in low socioeconomic status, religious and infrequent or no consumption of meat. (34) Prevalence of micronutrient deficiencies was high in adolescent girls. (34)

Oral health among adolescent (Table 5)

Oral health knowledge is very poor among adolescent though it is an important health issue. In a study by Gupta T *et al* found that 90% of participants had knowledge about causes of dental caries and the role of tooth brushing in its prevention. Lower proportions of participants were aware of gum disease and the role of fluoride and dental floss. A majority of the children used a toothbrush and toothpaste, 63.3% of the children did not know whether their toothpaste contained fluoride or not, 61.9% of them cleaned their teeth two or more times a day and only 18.2% of the children visited the dentist for routine check-ups. Rural adolescents have increased inadequate oral hygiene and few have not visited a dentist. (35)

The prevalence of dental caries in primary teeth was found to be 49.6% and in permanent teeth was 41%.

Most of the children need one surface filling followed by pulp care. (36)

Sachan B *et al* reported in their study that teeth and gum problems among adolescent was 14.2%. (37)

In a study conducted by Srinivasan *et al* found 21.5% with dental caries in Tirupati among 598 children aged 6–17 years. (38) Singh *et al* reported inadequate oral hygiene in 55.4% of adolescents. (39)

Behavioural problems, depression, and other psychiatric conditions (Table 6)

Adolescents are rarely perceived to be ill, while in fact they have significant morbidity and mortality related to mental health problems. There is a high prevalence of psychiatric illness among adolescents and the escalation of mental health admissions of adolescent is 14-fold by the age of 15 year. (40) Studies from India consistently document the highest suicide rates in the world, and the majority of completed suicides had been seen within adolescents group. (41) Prevalence of depression among Indian adolescent was 13.3% by using Patient Health Questionnaire – 9 (42) and 3.13% by using K-SADS-PL (Kiddie-Sads-Present and Lifetime). (43) Major depressive disorder was diagnosed in 0.81%, dysthymia in 1.51% and depressive disorder NOS (Not Otherwise Specified) in 0.81%. (43)

On psychiatric evaluation psychopathological illnesses (47%) like attention deficit hyperkinetic disorder, conduct disorder and depression were found to be commonly associated with poor educational performance (47%) followed by decreased learning opportunities (22.2%) and borderline intelligence (19.4%) in children with epilepsy. (44) Age, class attendance, family history of psychiatric illness and birth complications emerged as significant predictors of depression. (45) Boys consulted mainly friends or peers in 48% cases while girls consulted their mothers in 63% cases to resolve the psychological and behavioural problems of adolescent. Compared to the dispensary-based adolescent health clinic, utilization of psychosocial health counselling was significantly higher in a school-based clinic. (45)

Higher proportion of urban students than rural (67.3% vs. 62.5%) reported that their guardians understood their problems. Mental health issues like loneliness, worry and suicidal thoughts were higher among urban students. Physical fight, bullying, physical attack by family members and by teachers were all more in urban adolescents. Mental health and violence-related issues were prevalent more among urban students than those among rural students in spite of having more protective factors suggesting the need of frequent supervision, monitoring, and support of adolescents. (46)

In this review the prevalence of tobacco use varies from 25.1% (1999) to 12% (2014). Which showing decreasing trend. Prevalence of obesity varies from 3.4% (2008) to 0.35% (2012) and prevalence of overweight varies from 5.5% (2007) to 5.84% (2012). Both showing the decreasing trend. Prevalence of depression varies from 18.4% (2009) to 13.3 % (2013). This also showing decreasing trend. But prevalence of anaemia varies from 29% (2006) to 41.1% (2012). Which showing increasing trend. Similarly the prevalence of dental problems is showing increasing trend. Whose prevalence varies from 18.2% (2012) to 41% (2012). Prevalence of dysmenorrhoea varies from 67.2% (2008) to 56.15% (2012) among adolescent girls. Which is also showing decreasing trend. Prevalence of alcohol consumption among adolescent is going on increasing trend in rural adolescents and decreasing trend among urban adolescents. The prevalence of alcohol consumption among urban adolescent varies from 32.2% (1999) to 5.23% (2010) and the prevalence of alcohol consumption among rural adolescent varies from 1.3% (1999) to 7.37% (2010). The review depicts that adolescents in India have many problems which need special attention and care. Adolescents require a strong family and society support. Primary care practitioners are the main health care providers to all families in India. Primary care practitioners should update knowledge on adolescence health problems and involve in health education in the form of role play and health education talk. These will encourage the adolescents to get knowledge and awareness about their health problems and consult to doctors.

Conclusion

To conclude adolescents in India are facing problems of sexually transmitted infections, dysmenorrhoea, tobacco and alcohol use, depressive problems, physical fights, worry, loneliness and oral health problems. Health education and counselling to adolescents are necessary in India to improve adolescence health. Primary care practitioners may act as a bridge between the family and adolescents to solve the problems. Simultaneously awareness to the programmes related to adolescent health should

be generated among family members so that they can also advise and guide the adolescents. This type of health education programme can be held by primary care practitioner doctors in their locality with involving family members and adolescents.

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Tables

TABLE 1 SEXUAL HEALTH ISSUES AND TEENAGE PREGNANCY

Authors	Year of publication, place of study	Sample size	Problems faced	Prevalence/incidence /proportion	Age group (yrs)
R.Shashi kumar *et al* [10]	2012	586	Sexual health knowledge among literate adolescent women Prevalence of RTIs / STIs Seeking health care for RTI / STI among married adolescent women Knowledge about sexuality	41% 41% 20% Poor	13-18 yrs
Reshma P. Gadkari *et al* [6]	2012	100	Poor sexual health awareness Among male Among female	 50% 61%	13-18yrs

Shah *et al* [9]	2012	500	Lack of knowledge, misconception and negative belief regarding contraceptive methods	Negative belief like are – impotence after condom use, weakness after sterilization, fear of becoming obese after use of contraception	15-19yrs
Rees CA *et al* [47]	2012, west Bengal	665	Knowledge about STD among girls not going to school	Less	11-17yrs
Wilson EK *et al* [8]	2013, seven states of India	3207 Adolescent mother	Among 50% of sexually active adolescent mother not using contraception	19%	15-19yrs
J Kishore *et al* [48]	1999, Delhi	351	Prevalence of premarital sexual intercourse	12.5% (urban) 11.2% (rural)	10-19yrs
Nair M.K.C.[4]	2004	Editorial	Highest levels of adolescent childbearing and early age at marriage for female Women in age group 20 -24 yrs have a child before they reach age 20 in India Adolescent girls using contraception in India Premarital sexual activities among adolescent in India	Bangladesh, Nepal, India 50% < 10% Increasing trend	10-19 yrs
Jain Timsi *et al* [49]	2014, Northern India	210	Sexual activity	10%	10-19 yrs

TABLE 2 PROBLEMS RELATED TO MENSTRUATION AND MENSTRUAL HYGIENE

Authors	Year of publication, Place of study	Sample size	Problems faced	Prevalence/incidence/proportion	Age group (yrs)
Dambhare DG *et al* [12]	2012, Central India	1100	Abnormal menstrual cycle length Dysmenorrhrea Premenstrual syndrome	30.48% 56.15% 56.16%	11-17 yrs
Sharma P *et al* [11]	2008, Delhi	198 Adolescent girls	Dysmenorrhoea Daily routine of work affected Miss a class Abstain from work	67.2% 60% 17.24% 25%	13-19 yrs
Alka Barua *et al* [7]	2001, Maharastra	302 married girls 74 adolescent girls 37 husbands 53 mother in law	Menstrual disorders and symptoms of reproductive tract infection	Untreated	15-19 yrs
Suresh K. kumbhar *et al* [50]	2011, Kadapa district, Andhra Pradesh	183	Prevalence of dysmenorrhoea	65%	14 – 19 yrs

TABLE 3 ADOLESCENT ILLICIT DRUG, TOBACCO AND ALCOHOL USE

Authors	Year of publication, Place of study	Sample size	Problems faced	Prevalence/incidence/proportion	Age group (yrs)
Deep Patel *et al* [14]	2012, India	172	Use of smoked tobacco Use of smokeless tobacco	9.1% 17.4%	11-16 yrs
Surani NS *et al* [15]	2012, Mumbai	534	Prevalence of ever use of tobacco Ever use of tobacco	5.1% More in private school students	10 -17 yrs
Janardhanan C *et al* [16]	2012, South India	43	Volatile solvent used as inhalant	48.83%	19 yrs
J Kishore *et al* [48]	1999, Delhi	351	Prevalence of consumption of alcohol Prevalence of smoking Prevalence of consuming bhang	32.2% (urban) 1.3% (rural) 25.1% (urban) 48.7% (rural) 11.5% (urban)	10-19 yrs

				16.5% (rural)	
Poonam Dhavan *et al* [51]	2009, India	6368 (2004) 5953 (2005) 4956 (2006)	Prevalence of life time use of any tobacco products	10.4% (2004) 15.4% (2005) 20.3% (2006)	10-16 yrs
Dechenla Tsering *et al* [52]	2010, Eastern India	416	Prevalence illicit drug use Prevalence of tobacco use Prevalence of alcohol use	6.14% (rural) 0.6% (urban) 8.60% (rural) 11.04% (urban) 7.37% (rural) 5.23% (urban)	12-16 yrs
Babar AA *et al* [53]	2010, India	11,642	Ever use of tobacco	14.77% (Girls) 21.1% (Boys)	10-14 yrs
Annes Ahmed *et al* [54]	2007	390	Prevalence of substance abuse	13.3%	10-19 yrs
Ranabir Pal *et al* [55]	2009, India	Systematic review	Prevalence of ever users of tobacco	18.15%	10-18 yrs
Timsi Jain *et al* [49]	2014, North India	210	Prevalence of alcohol and tobacco use	12%	10-19 yrs

TABLE 4 OBESITY, EATING PROBLEMS, UNDER NUTRITION AND ANAEMIA AMONG ADOLESCENT

Authors	Year of publication, Place of study	Sample size	Problems faced	Prevalence/incidence/proportion	Age group (yrs)
Stigler MH *et al* [20]	2011, Delhi	1818	Prevalence of obesity	16.6%	12-16 yrs
Arora M *et al* [31]	2012, Delhi	1814	Daily consumption of breakfast Prevalence of obesity among adolescent, who consumed breakfast daily Prevalence of obesity among adolescent, who never consumed breakfast	73.8% (Govt. School) 66.3% (Private School) 14.6% 22.9%	12 – 18 yrs
Swati Bhardwaj *et al* [23]	2008, Asian Indian	3493	Prevalence of overweight and obesity among adolescent	24.3%	14-19 yrs
Deoke A *et al* [28]	2012	565	Prevalence of overweight Prevalence of obesity Combined prevalence of overweight and obesity	5.84% 0.35% 6.19%	12-16 yrs
Bishwalata R *et al* [27]	2010, Manipur	3356	Prevalence of overweight Prevalence of obesity	4.2% 0.8%	12-18 yrs
Choudhary A *et al* [34]	2006, South India	100	Prevalence of anaemia	29%	11-18 yrs
T Aggarwal *et al* [56]	2008, Ludhiana, Punjab	1000	Prevalence of obesity Prevalence of overweight	3.4% 12.7%	10-18 yrs
Goyal RK *et al* [57]	2010, India	5664	Prevalence of overweight Prevalence of obesity	14.3% (among boys) 9.2% (among girls) 2.9% (among boys) 1.5% (among girls)	12-18 yrs
Ramesh Chellan *et al* [58]	2010, India	180,839	Prevalence of anaemia	97.8%	10-19 yrs
Aprita mandal *et al* [59]	2012, Kolkata	571	Prevalence of overweight Prevalence of obesity	28.5% 4.2%	12-18 yrs
Nitish mondal *et al* [60]	2010, Darjeeling, West Bengal	726	Prevalence of stunting Prevalence of thinness	46.6% 42.4%	10 -17 yrs
Meenal vinay kulkarni *et al* [61]	2012	272	Prevalence of anaemia	90.1%	10-19 yrs
T Jain *et al* [62]	2011, Meerut, UP	400	Prevalence of anaemia among adolescent boys	42.8%	10-19 yrs
Krutarth R Brahmbhatt *et al* [63]	2012, Ahmedabad, Gujarat	900	Prevalence of obesity Prevalence of overweight	5.4% 13.3%	10 -19 yrs
Shilpa S *et al* [64]	2012	840	Prevalence of anaemia	41.1%	10 – 19 yrs
Kodavanti Mallikharjuna Rao *et al* [65]	2006, nine states of India	12,789	Prevalence of under nutrient among adolescent boys Prevalence of under nutrient among adolescent girls	63% 42%	10-17 yrs

Parekh Alok *et al* [66]	2012, Surat, Gujarat	389	Prevalence of obesity Prevalence of underweight	12.8% (rural) 14.6% (urban) 13.6% (rural) 4.6% (urban)	14-16 yrs
Bidhan Kanti Das *et al* [67]	2009, India	930	Prevalence of under nutrition	28.6%	9-20 yrs
Singh R *et al* [68]	2007, North India	1083	Prevalence of overweight	5.5%	12-17 yrs

TABLE 5 ORAL HEALTH AMONG ADOLESCENT

Authors	Year of publication, Place of study	Sample size	Problems faced	Prevalence/incidence /proportion	Age group (yrs)
Gupta T *et al* [35]	2012, South India	664	Knowledge about causes of dental caries and the role of tooth brushing for its prevention Visited dentist for routine check – up	> 90% 18.2%	15 yrs
Beena sachan *et al* [37]	2012	847	Teeth & gum problems	14.2%	10 – 19 yrs
Khare v *et al* [34]	2012, Vellore, South India	923	Prevalence of dental caries in primary teeth Prevalence of dental caries in permanent teeth	49.6% 41%	7-19 yrs

TABLE 6 BEHAVIOURAL PROBLEMS, DEPRESSION AND OTHER PSYCHIATRIC CONDITIONS

Authors	Year of publication, Place of study	Sample size	Problems faced	Prevalence/incidence /proportion	Age group (yrs)
Samanta A *et al* [46]	2012, West Bengal	199	Missed classes or school without permission Loneliness Worry Suicidal thoughts Physical fight Bullying Physical attack by family member Physical attack by teachers Guardian understood their problems	53% (urban), 10.7% (rural) 17.3 % (urban), 9.8% (rural) 17.3 %(urban), 10.7 %(rural) 19.2% (urban), 14.1% (rural) 53.8% (urban), 11.6% (rural) 46.4 %(urban), 17 %(rural) 46 %(urban), 17 %(rural) 53 %(urban), 10.7 %(rural) 67.3% (urban), 62.5% (rural)	13 -15 yrs
Janardhanan C *et al* [16]	2012, South India	43	Reported withdrawal symptoms Reported aggression Reported externalizing symptoms Reported ADHD	77% 54.5% 77.3% 50%	19 yrs
J Kishore *et al* [48]	1999, Delhi	351	Prevalence of physical fights	66.8% (urban) 51.3% (rural)	10-19 yrs
Choudhary A *et al* [34]	2006, Vellore, South India	100	Prevalence of perceived low body image satisfaction among adolescent girls	55.1%	11-18 yrs
Singh H *et al* [44]	2012, India	100	Educational problems reported	36%	6–16 yrs
Sarkar S *et al* [43]	2012, India	1851	Prevalence of depressive disorders	3.13%	6–14 yrs
Ganguly S *et al* [42]	2013, India	233	Prevalence of depression	13.3%	14-18 yrs
Rani Mohan raj *et al* [69]	2010, South India	964	Prevalence of mild depression Prevalence of moderate to severe depression	37.1% 23.7%	14-18 yrs
Vivek Bansal *et al* [70]	2009	125	Prevalence of depression	18.4%	13-15 yrs
Anees Ahmad *et al* [54]	2007	390	Prevalence of psychosocial problems Prevalence of educational difficulties Prevalence of conduct disorders	17.9% 17.4% 9.2%	10-19 yrs
Aravind Pillai *et al* [71]	2008, Goa	2048	Prevalence of mental disorders	1.81%	12-16 yrs
Kumar R *et al* [45]	2008	360	Psychological and behavioural problems	60%	10 – 19 yrs